

Gordon K. Squires¹ (squires@ipac.caltech.edu), Frank Summers², Carolyn Brinkworth¹, Robert Hurt¹, Michael Greene³

¹ Caltech/IPAC ²STScI ³JPL

E/PO and Science Considerations for Data Visualization

Background

Data visualization for large datasets is a challenge for science and outreach activities alike. From the science perspective, large--area, giant--pixel images are a challenge to visualize in the holistic manner needed to gain the perspective of the entire dataset. Understanding the “big picture” is vital for scientists to drive their intuition and enable their ability to explore the entire dataset in a meaningful way.

An example is illustrative: at the summer 2012 AAS meeting, the NASA exhibit included a large visualization wall – a series of large format screens on which large images could be displayed and explored. Following an AAS press conference in which new large images were released, Robert Hurt, IPAC visualization scientist, displayed the images on the visualization wall, allowing the scientists who produced the images the opportunity to see them in detail and in their entirety. Even though they were very familiar with their data, they remarked that they were seeing things in the images for the first time, and for the first time understanding the interplay of physics throughout the region. They were able to “see the forest *and* the trees.”

These needs are echoed for outreach activities as well. Current platforms such as Microsoft’s World Wide Telescope allow images to be placed on the sky, scrolled, panned and zoomed. As the size of the datasets increase, this becomes a more difficult challenge, however. Citizen science activities may require the ability to visualize large areas of sky as well as explore fine details to perform specific activities. An example of a current such project is The Milky Way project (<http://www.milkywayproject.org/>), exploring the 800,000 Spitzer image--mosaic of the Milky Way plane to identify star--forming regions, or “bubbles.”

A challenge for future missions will be to provide scientists and the public alike with mechanisms to explore the images on large and small scales. With 300 megapixel images, something like 100 megapixel display mechanisms will be needed to visualize and explore the data. These sorts of opportunities could be provided physically at mission science centers, select museums and planetaria, and other venues.